

**FILED**

UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF PENNSYLVANIA

EASTERN DIVISION

H. STUART CUNNINGHAM, CLERK  
UNITED STATES DISTRICT COURT

BALLY MANUFACTURING CORPORATION, :  
Plaintiff

: Civil Action

v

: No. 78 C 2246

D. GOTTLIEB & COMPANY,  
WILLIAMS ELECTRONICS, INC., :  
and ROCKWELL INTERNATIONAL, :  
Defendants :

**DOCKETED**

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VOLUME III

Pages 279 - 368, inclusive

Deposition of: GREGORY COX

Taken by : Defendant Gottlieb

Before : Susan M. Simon, RPR  
Reporter-Notary Public

Beginning : 8:30 a.m., Monday  
October 12, 1981  
1500 South Atherton  
State College, Pennsylvania

COUNSEL PRESENT:

A. SIDNEY KATZ, Esquire  
For - Plaintiff

MELVIN M. GOLDENBERG, Esquire  
For - Defendant Williams Electronics

BENJAMIN NOVAK, Esquire  
For - Gregory Cox

COUNSEL OF RECORD:

SYDNEY M. LEACH, Esquire  
For - Defendants Gottlieb and Rockwell

1 GREGORY COX, having been previously sworn, testified  
2 as follows:

3 CROSS EXAMINATION

4 BY MR. GOLDENBERG:

5 Q You are under oath, and this is a resumption of your  
6 deposition. Do you understand that?

7 A I understand, yes.

8 Q Mr. Cox, do you recall some questions that Mr. Leach  
9 put to you about telephone conversations that the two of you  
10 had had before your deposition was taken here?

11 A Yes, I do. The questions you are referring to in the  
12 prior testimony?

13 Q Yes.

14 A Yes.

15 Q Do you recall, sir, in any one of those conversations  
16 telling Mr. Leach that if he wanted to speak to you he would  
17 have to make arrangements through Mr. Schnayer?

18 A In the telephone conversations that transpired?

19 Q Yes, sir.

20 A Yes, I remember that.

21 Q Why did you do that, sir?

22 A That was at Mr. Schnayer's request since they had  
23 retained me as a consultant. He wanted me to be a party to any  
24 testimony or information that I provided to Mr. Leach or his  
25 firm or your firm.

1 Q You say you were retained as a consultant. Exactly  
2 how were you going to consult, sir?

3 A The agreement was that I was to be paid on an hourly  
4 basis for the time I spent associated with the analysis of the  
5 El Toro pinball game and providing information about various  
6 other events that transpired during my employment at Cyan  
7 Engineering.

8 Q What do you mean by providing information, sir, would  
9 you explain?

10 A Factual evidence about events that transpired during  
11 the time I was at Cyan Engineering.

12 Q Is it correct, sir, that you were also to be paid  
13 during any time you spent giving your deposition in this case?

14 A Yes, depositions or Court testimony were requirements  
15 for my time.

16 Q Were you to advise them on any technical matters?

17 A Of what nature? Outside the scope of the El Toro  
18 pinball machine?

19 Q Yes, sir.

20 A No.

21 Q Were you to advise them on any technical matters with  
22 respect to the El Toro pinball machine?

23 A In the perspective of the work I did on it and the  
24 information I knew about it.

25 Q So in other words you were to be paid for meeting with

1 them, talking on the telephone to them, giving testimony about  
2 facts within your knowledge, is that correct, sir?

3 A Yes.

4 Q Pursuant to these instructions from Mr. Schnayer you  
5 had no further telephone conversations with Mr. Leach, isn't  
6 that correct?

7 A He did not call me again, that is correct.

8 Q Did you in the course of the conversation where you  
9 told him that you had had these instructions from Mr. Schnayer  
10 -- let me withdraw that.

11 In the course of this conversation where you told him  
12 you had these instructions from Mr. Schnayer, did you go on and  
13 talk to him about the matter or was that the end of the  
14 conversation?

15 A As I recall the conversation it was brief, three to  
16 five minutes in length. He asked a few questions which I  
17 answered. I don't recall the specifics of those questions.

18 After a few minutes I felt that any more information  
19 should be coordinated through Mr. Schnayer based on his request.  
20 I informed Mr. Leach of that and the conversation was terminated.

21 Q You have had no further conversations with Mr. Leach  
22 since that time, is that correct?

23 A Yes.

24 Q You had none with me, have you, none at all?

25 A No.



1 Q Prior to appearing for your deposition on September 11,  
2 did you have any meetings with the attorneys for Bally on that  
3 day or the day before that day?

4 A The day before that Mr. Novak and myself had dinner  
5 with Mr. Leach and Mr. Welsh.

6 Q Mr. Katz?

7 A I'm sorry, Mr. Katz and Mr. Welsh.

8 Q Could you tell me, sir, what was said in the course  
9 of that dinner meeting?

10 A We discussed the format of the deposition since I  
11 was unfamiliar with a deposition, what would be expected of me,  
12 what the proceedings would be like.

13 As I recall we covered some of the points there in  
14 the affidavit, and I forget the specific term for the second  
15 document -- declaration.

16 Other than that just social pleasantries.

17 Q Did you have a meeting the morning of the deposition,  
18 meet for breakfast or anything?

19 A I don't believe so. I don't recall having breakfast  
20 with them that morning.

21 MR. KATZ: During this pause I would like to renew  
22 our offer to the defendants that we would be glad to have the  
23 defendants split the cost of the compensation that is being paid  
24 for Mr. Cox' time at the deposition since we feel that  
25 professional people should not be required to spend their time

1 on matters they have no interest in without being adequately  
2 compensated.

3 We made the offer once, and we never got an answer.  
4 I don't expect that I will get an answer this time either.

5 MR. GOLDENBERG: You may get a response, sir. I  
6 don't know that you will get an answer.

7 There was no such offer ever made to me. If it were  
8 made to me I would turn it down. I think it has become quite  
9 clear I think the whole procedure is inappropriate.

10 MR. KATZ: We have a dispute there.

11 MR. GOLDENBERG: There are agencies that handle that,  
12 sir.

13 BY MR. GOLDENBERG:

14 Q Do you recall, sir, as we closed the last deposition  
15 session I was interrogating you about the matter of stuck  
16 switches?

17 A Yes.

18 Q Have you reviewed the transcript of the last session?

19 A Yes.

20 Q I believe it was your testimony that according to the  
21 program that you wrote, sir, if a switch is stuck closed the  
22 program would not proceed and that it would not go on and sample  
23 the next switch and do whatever had to be done in response to  
24 any indication the system picked up at the next switch, is that  
25 correct, sir?

1 A Not completely.

2 Q Could you state it?

3 A Yes. The program would continue to sample other  
4 switches and would continue to cycle in that sampling sequence.  
5 However, it would fail to respond to the closure of the switches  
6 and the manner of accumulating score or activating a light or  
7 kicker response to the switch closure.

8 Q In connection with your work on the El Toro game,  
9 did you ever encounter a switch stuck closed?

10 A Not that I recall.

11 Q At the time you did your work on the El Toro game,  
12 you had had considerable experience as a programmer, had you not?

13 A Yes.

14 Q Do you believe it to have been within your skill that  
15 if you had encountered that situation to revise the program to  
16 accommodate that situation, if it had been encountered?

17 MR. KATZ: Objection to the question as calling for  
18 speculation.

19 A If I had encountered such a situation, I would have  
20 modified the program to make some allowance for it. Just what  
21 or how I couldn't state. It would have been some attempt to  
22 alleviate the effects of such a problem.

23 BY MR. GOLDENBERG:

24 Q You think you could have done it?

25 A Yes.

1 Q I think you said you did encounter the situation of  
2 the switch stuck in the open position during that period?

3 A Yes.

4 Q And all that was done there was to bend the switch  
5 contact and to make it operate properly, is that correct?

6 A As I recall it, yes.

7 Q So would it be a fair statement that in both situations  
8 -- the switch stuck open or the switch stuck closed -- it was  
9 within the level of skill that you had at that time to correct  
10 the situation if either one or both of those situations had  
11 occurred?

12 MR. KATZ: Objection to the question as calling for  
13 pure speculation from this witness.

14 A I believe so, yes.

15 BY MR. GOLDENBERG:

16 Q Sir, do you have your affidavit in front of you which  
17 I think is Exhibit 24?

18 A Yes, sir.

19 Q Would you turn to page 3, specifically to paragraph  
20 11 on that page.

21 Let me know when you have read the entire paragraph,  
22 sir.

23 A I have completed it.

24 Q As to whether or not any tests were performed on the  
25 modified El Toro to determine the machine's susceptibility to

1 electronic static noise, you really don't know, do you, sir?

2 A I would know what work was done on the El Toro during  
3 the time I was there. I know of no such tests.

4 Q You know every bit of work that was done on the  
5 El Toro during the time that you were there?

6 A Any work of significance, yes.

7 Q You were with it at all times?

8 A I was in attendance at the job every day.

9 Q But you still really don't know, sir? You were not  
10 responsible for the electrical circuitry, were you?

11 A The statement stands on its own. It says to my  
12 knowledge those tests were not performed.

13 Q But I am saying, sir, you really don't know.

14 A I cannot guarantee that those tests were not performed  
15 if that is what you are getting at.

16 Q What I am getting at, sir, or trying to get at is  
17 what you know.

18 A Which is stated in the affidavit.

19 Q You don't know whether tests were performed, do you?

20 A It appears to me you are trying to distort the wording  
21 of this affidavit. It says to my knowledge these tests weren't  
22 performed, and to my knowledge they were not.

23 Q But you don't know whether or not they were, sir, do  
24 you?

25 A I don't know that they were.

1 Q You don't know either way?

2 A I believe they were not.

3 Q But you don't know, do you, sir?

4 MR. KATZ: Objection to the question as having been  
5 asked and answered. I think you have reached to point of  
6 badgering the witness.

7 BY MR. GOLDENBERG:

8 Q You can answer the question, sir.

9 A No, I cannot.

10 Q Why not?

11 A What is knowledge?

12 Q I don't intend to get in a philosophical discussion,  
13 sir.

14 MR. KATZ: Objection to the question as indefinite as  
15 stated. Apparently the witness doesn't understand your use of  
16 the term.

17 A Based on my understanding of what knowledge is or  
18 knowing something, I know of no occurrence where such tests were  
19 performed. I believe that I would have been knowledgeable of  
20 them if they had taken place.

21 BY MR. GOLDENBERG:

22 Q I see, sir. What is electrostatic noise?

23 A Electrical interference within a circuit caused by  
24 voltage differential due to static-type electricity.

25 Q How does it occur in a pinball game? How can it

1 possibly occur in a pinball machine?

2 MR. KATZ: Objection to the question as calling for  
3 an opinion of the witness without having shown that he has ever  
4 formed such an opinion in the past.

5 Also object to the question as lacking foundation.

6 A Could you repeat the question..

7 (Question read by reporter.)

8 A The most obvious method of occurrence within any type  
9 of device whether it be a machine or electrical or mechanical  
10 device would be some sort of a voltage differential between the  
11 player and the machine due to player walking across a wool  
12 carpet in a cool, dry climate, for instance.

13 BY MR. GOLDENBERG: electrostatic noise on the pinball machine

14 Q Were there any wool carpets at Cyan Engineering  
15 Laboratories?

16 A Not that I recall.

17 Q Let me see if I understand you, sir. The player  
18 walking across the wool carpet, he accumulates an electrostatic  
19 charge?

20 A Yes.

21 Q As he approaches the machine this charge somehow  
22 affects the voltages in the electrical circuitry of the game?

23 A It would be possible as he touched the game, touched  
24 the little part that was used as a ground on the machine it  
25 could introduce noise on the grounding circuits of the machine.



1 Q What metal parts were there in the El Toro that a  
2 player could touch and create that kind of noise?

3 A There were legs, there was a metal frame around the  
4 top of the glass.

5 Q You are sure there were metal legs on the machine?

6 A To the best of my recollection, yes.

7 Q You are sure there was a metal frame around the glass  
8 covering the playfield, is that what you are referring to?

9 A Yes.

10 Q And the player could touch that. Is there any other  
11 way that you know of?

12 A Any other way of what?

13 Q Creating electrostatic noise on the pinball machine.

14 A I'm sure there are other ways. If a package or some  
15 other object were placed on the machine which had a charge  
16 differential from the pinball machine, some sort of package or  
17 object with a different charge were to be moved against the AC  
18 connecting wires, it could possibly produce a voltage noise on  
19 those wires through a coupling.

20 Q In your prior work, prior to joining Cyan Engineering,  
21 had you ever encountered the problem of electrostatic noise in  
22 the equipment that you were working on?

23 A Not electrostatic, no. I had dealt with other types  
24 of noise.

25 Q What other types, sir?



1 A Ground loop-type noise, coupling noise through high  
2 frequency digital logic circuits, cross coupling-type noise.

3 Q Is that not an uncommon problem in electronic equip-  
4 ment in your experience, sir?

5 MR. KATZ: I object to the question as vague and  
6 indefinite and too general.

7 A It is common in some situations but not in others.  
8 Different types of noise are symptomized by different types of  
9 electrical hardware implementation.

10 Printed circuit boards tend to be more susceptible to  
11 noise coupling than boards with hard wires on them.

12 Q What kind of noise are printed circuit boards  
13 susceptible to?

14 A Coupling between traces on the boards, electrical  
15 circuits that are etched on the boards, when they run close to  
16 each other one can pick up a signal from the other which would  
17 act as noise or interference.

18 Q Based on your experience had engineers and others  
19 with whom you have been associated, have they developed  
20 techniques for taking care of those noise problems when they  
21 arise?

22 A Yes, there are design techniques. Generally they  
23 are not completely successful.

24 Q But they are known and used, are they not?

25 A Some are, yes.

1 Q That was true in 1974, wasn't it?

2 A Yes.

3 Q Could you explain as of 1974 what you understood some  
4 of those techniques to be?

5 A Providing solid ground connections through parallel  
6 pads to the ground pins of integrated circuits for instance.

7 In other words, instead of putting all the ground  
8 lines serially from chip to chip to parallel off the ground.  
9 This tended to reduce noise in the integrated circuits.

10 Secondly where high frequency logic signals were run  
11 on integrated circuit traces, these would be separated from  
12 other sensitive circuits on the circuit board.

13 Where high frequency signals were routed by wires,  
14 they would be insulated and shielded so that they wouldn't  
15 interfere with other wires nearby.

16 Techniques of that nature.

17 Q Were you familiar with techniques of using actual  
18 circuits as noise suppressing circuits?

19 A Yes.

20 Q Those were known in 1974 too, weren't they?

21 A Yes.

22 Q Where noise problems were encountered, one or more  
23 of these techniques would be used to solve or almost solve the  
24 problem?

25 A Yes.

1 MR. KATZ: I object to the question as leading.

2 BY MR. GOLDENBERG:

3 Q Continuing on in paragraph 11, you state there, sir,  
4 that no tests were performed on the machine to determine if it  
5 accurately scored playfield switch closures other than finger  
6 tests which involved activating the playfield switches with a  
7 finger or ball to see if a proper score was recorded.

8 What test would be envisioned other than those, sir,  
9 or did you envision?

10 Q What tests were possible at that time other than  
11 those tests, sir?

12 MR. KATZ: Objection to the question as lacking  
13 foundation as to whether this witness has sufficient familiarity  
14 to know which or what such tests were possible.

15 A I had no preconceived or preknowledge ideas about  
16 how to test the switches. I was not familiar with the testing  
17 of pinball playfields and had no specific opinion then or now  
18 as to a different type of test to conduct to verify proper  
19 playfield operations.

20 BY MR. GOLDENBERG:

21 Q Did you observe the test that you just referred to  
22 in your affidavit?

23 A Yes.

24 Q Did you observe in the course of any of those tests,  
25 sir, that the score was not recorded accurately?

1 A I don't recall a specific event of that, but it would  
2 have been probable during the early development cycle of the  
3 software and the hardware that there were problems which  
4 resulted in incorrect score accumulation which were later  
5 corrected.

6 Q Let's take the project at the time of the open house,  
7 sir, the status it had at that time.

8 Was it recording score correctly?

9 A To the best of my recollection, yes.

10 Q Was it recording score correctly at the time you left  
11 the employ of Cyan Engineering?

12 MR. KATZ: Objection to the question as lacking  
13 foundation.

14 BY MR. GOLDENBERG:

15 Q To the extent that you know, sir.

16 A I'm not certain that the El Toro machine was being  
17 used with the INTELLEC system at the time I left the company,  
18 so I can't say. The last time I saw the machine in operation  
19 it was accumulating score properly.

20 Q When the game was being played were the flippers  
21 acting properly in response to the player use of the flipper  
22 control buttons?

23 MR. KATZ: Objection to the question as lacking  
24 foundation and indefinite.

25 A You will have to put that in a time frame as to when.

1 BY MR. GOLDENBERG:

2 Q Let's take at the time of the open house, sir.

3 A Yes.

4 Q Let's take the last time you saw the game being played.

5 A Yes, the flippers were working properly.

6 Q Were the thumper bumpers responding properly?

7 A To the best of my recollection both at the open house  
8 and the last time I saw the game operating connected to the  
9 INTELLEC all portions of the game were operating properly.

10 Q The lights were lighting properly?

11 A Yes.

12 Q The score was being registered?

13 A Yes.

14 Q Every aspect of the game to your recollection, is  
15 that correct, sir?

16 A Yes.

17 Q At the time of the open house how was the game play  
18 initiated? Did a coin have to be dropped into the coin slot?

19 A As I recall the front access door to the machine was  
20 left unlocked and you could activate the coin switch mechanism  
21 with your finger to accumulate games.

22 Q On the backboard of the game, if you know what I mean,  
23 each time you did that was a credit registered?

24 A Yes.

25 Q That was displayed?

1 A Yes.

2 Q Was that operating properly, sir?

3 A Yes.

4 Q How many balls were given for each game?

5 A As I recall that was selectable, either three or five.

6 Q At different times was that changed to give you  
7 different balls or five balls or was it always one or the other?

8 A How do you mean at different times?

9 Q Let's take in the period of the open house, sir. Was  
10 it set to give three balls or five balls?

11 A As I recall it was generally set to five balls.  
12 During the development of the game we tested to verify that  
13 both the three and five ball cycles operated properly, but  
14 generally it was left in the five ball play position.

15 Q At the time you tested it during the development  
16 period when you set it for three balls, would it give three  
17 balls?

18 A Yes.

19 Q When you set it for five balls, would it give five  
20 balls?

21 A Yes.

22 Q When it was set later on for five ball play, did it  
23 always give five balls?

24 A To the best of my recollection, yes.

25 MR. KATZ: Objection to the series of questions as

1 lacking foundation.

2 BY MR. GOLDENBERG:

3 Q Had you played pinball games before beginning work  
4 on the El Toro project?

5 A Yes, I had.

6 Q That was just as diversion or amusement?

7 A Yes.

8 Q Not in any professional capacity, is that correct?

9 A That's correct.

10 Q At the time you began work on the El Toro project,  
11 did you have any knowledge as to how a pinball game should  
12 play based on your prior exposure to them?

13 A I was familiar with pinball games and how they played.

14 Q Did you see any differences in the play of the El  
15 Toro game at the time of the open house from what your previous  
16 experience had shown you, sir?

17 MR. KATZ: Objection to the question as lacking  
18 foundation. I believe that the witness testified in the first  
19 session on direct examination by Mr. Leach that he had no  
20 specific recollection of any particular person playing the  
21 game at the open house and that he had no specific recollection  
22 that he played the game at the open house.

23 BY MR. GOLDENBERG:

24 Q I will revise my question, sir, to say around the  
25 time of the open house.



1 A At or near the completion of the El Toro pinball  
2 project when the machine was operating with the microprocessor  
3 controller it externally appeared to operate as it had before  
4 it had been modified, that is, in the electromechanical  
5 configuration.

6 It of course played different than other pinball  
7 machines but was typical of the operation of pinball machine.

8 Q What do you mean by played different?

9 A Other pinball machines have different arrays of  
10 switches and different types of lights and score differently,  
11 have different single or double play options, that sort of  
12 thing.

13 Q Would it be correct, sir, what you meant by the answer  
14 that you just gave that an El Toro pinball machine is not like,  
15 say, an XYZ pinball machine manufactured by my client Williams  
16 Electronics?

17 A Correct.

18 Q Those were the only differences you saw?

19 A Well, there were differences in how the score was  
20 displayed. Instead of using mechanical score switches, LED,  
21 7 segment displays were used.

22 Q Were the sounds the same, to the extent that you  
23 recall?

24 A The sounds were slightly different.

25 Q How were they different, sir?



1       A     The relays had been removed from the machine so the  
2 relay noise was not present.

3            The noise from the mechanical score wheels were not  
4 present.

5       Q     You spoke of the El Toro project being completed.  
6 Could you explain what you meant by that?

7       A     What I meant was the end of my participation in the  
8 development of the El Toro pinball machine.

9       Q     When did that occur, sir?

10      A     I would guess sometime in June of 1974, just prior  
11 to or about the time of the open house, maybe shortly thereafter.  
12 I'm not certain as to the exact time frame.

13      Q     At that time did you have any conversation with any  
14 of your fellow employees at Cyan Engineering about the status  
15 of the El Toro project?

16      A     I don't recall any specifically, but I'm sure I must  
17 have.

18      Q     Do you recall any conversations with your fellow  
19 employees -- and when I say fellow employees I include your  
20 superiors whomever they may have been -- about whether or not  
21 a goal or objective had been achieved?

22      A     Yes. It was my impression and also that of Steve  
23 Mayer as I recall it that we had met our initial objective  
24 going into the program which was to make a microprocessor  
25 control circuit which drove the El Toro pinball machine and

1 caused it to play like it did in its original electromechanical  
2 form.

3 Q At that time or when you stopped work on the project,  
4 do I understand correctly that the INTELLEC 4 system was not  
5 physically in the El Toro cabinet, is that correct?

6 A Yes.

7 Q Were the circuit boards in the cabinet, do you know?

8 A Which circuit boards in which cabinet?

9 Q Well, the circuit boards on which there were the  
10 elements interfacing the INTELLEC with the El Toro game.

11 A Were they in the INTELLEC cabinet?

12 Q No, sir, were they in the El Toro cabinet.

13 A I don't believe so. I believe they were in a separate  
14 unit or enclosure distinct from the El Toro cabinet and the  
15 INTELLEC cabinet.

16 Q Would it be correct then you sort of had three units?  
17 You had the INTELLEC 4 unit in its enclosure, and then you had  
18 the interface boards in a separate enclosure.

19 A Yes.

20 Q Then the El Toro game in the third enclosure, but the  
21 third enclosure being the game cabinet?

22 A Yes.

23 Q Did that physical arrangement of parts in any way  
24 make playing the game difficult, to your knowledge?

25 MR. KATZ: Objection to the question as indefinite.

1 A As I recall it didn't interfere with the play of the  
2 game.

3 BY MR. GOLDENBERG:

4 Q Did it have any effect on the play of the game that  
5 you can see?

6 A No.

7 Q Do you recall the dimensions of the El Toro cabinet?

8 A No.

9 Q Do you recall them approximately?

10 A It appeared to be a standard size for a pinball  
11 machine. I would guess approximately 32 to 36 inches high at  
12 the playfield, maybe 20 inches wide, 22 inches wide.

13 Q The INTELLEC 4 contained far more than a micro-  
14 processor, did it not?

15 A Yes.

16 Q The actual microprocessor occupied a relatively small  
17 volume of the INTELLEC 4 container, isn't that true?

18 A Yes.

19 Q Even if you were to take the elements which turned  
20 the microprocessor into a microcomputer, that was still only a  
21 small volume of the INTELLEC 4 container, isn't that true?

22 A That may or may not be true depending on what your  
23 definition of microcomputer is and how many of the provisions  
24 of the INTELLEC 4 you feel are necessary to convert a micro-  
25 processor to a microcomputer.

1 Q Well, let's take not what I say, but let's take what  
2 you say.

3 A The INTELLEC 4 system contained a control panel with  
4 LED's and toggle switches. It contained the microprocessor.  
5 It contained memory. It contained interface circuits. It  
6 contained programs for software assembly, things of that sort.

7 If you define a microcomputer as a microprocessor  
8 with memory and input-output interfaces, then that could be a  
9 fairly significant portion of the INTELLEC 4 system depending  
10 on how much memory and how much interface would be required.

11 Q Let's take the El Toro game and the portions of the  
12 INTELLEC 4 that were used to control that game once modified.  
13 Was that a major portion of the INTELLEC 4 cabinet or something  
14 less than that?

15 If it helps you, sir, I show you this enlarged  
16 drawing of the system which in its chopped-up version is in  
17 the record as Exhibit 21.

18 MR. KATZ: What the witness is looking at is marked  
19 GD-56.

20 A Those portions of the INTELLEC 4 system used for  
21 specific individual control of the El Toro pinball game would  
22 be few. However, if dedicated to the use of the pinball game  
23 it would not have provided the interactive method of control  
24 that the INTELLEC 4 provided and which was required for the  
25 development and debugging of the software and hardware of the

1 game.

2 BY MR. GOLDENBERG:

3 Q Sir, I am talking about once the development and  
4 debugging was complete and you were actually controlling the  
5 game.

6 Is it a fair statement that those parts would be  
7 relatively few, those parts of the INTELLEC 4 would be  
8 relatively few once you were through this development and  
9 debugging stage?

10 A I believe so but I couldn't be certain about that  
11 because that design was never dedicated to a specific applica-  
12 tion to the El Toro.

13 Q Can you by reference to this drawing, GD-56 -- I  
14 think the cut-up version is Exhibit 21 -- indicate those parts  
15 shown on the drawing which were in the INTELLEC 4?

16 MR. KATZ: I object to the question as mischarac-  
17 terizing the document that the witness is looking at because  
18 the record will indicate there is no foundation in the record  
19 that this particular drawing actually depicted the El Toro  
20 system and in fact other testimony as Mr. Goldenberg knows  
21 indicates that in fact this particular drawing did not reflect  
22 the construction at any time of the El Toro project.

23 So I object to this question and lines of questions  
24 based on the document GD-56 because it is extracting from this  
25 particular witness opinions being formed now looking at this

1 document that have no basis in his actual factual recollection.

2 Therefore I think that this is totally improper, and  
3 I object to this kind of questioning unless it is established  
4 that as a foundation that this particular witness knows what  
5 the construction of the El Toro was apart from this particular  
6 drawing which in fact does not show it.

7 MR. GOLDENBERG: Are you finished?

8 MR. KATZ: Yes, sir.

9 BY MR. GOLDENBERG: To the witness?

10 Q I am not purporting who showed that to the witness  
11 prior to the giving of his deposition. Mr. Schnayer did that.

12 If it didn't represent the El Toro I don't know what  
13 in the world he had in mind. Nevertheless, Mr. Cox --

14 A May I answer the question now?

15 Q Please. Rely on your memory and as much help as  
16 this document GD-56 may provide you.

17 A The drawing shows interfaces between various elements  
18 of the INTELLEC 4 system and the El Toro interface electronics  
19 if we can call it that.

20 It shows interfaces in several areas with the read-  
21 only memories, the microprocessor. It shows the read-only  
22 memories and the microprocessors or individual components of  
23 the schematic.

24 However, I know that there are additional components  
25 required, such as, clocks, DC voltages, synchronizing signals,

1 read and write strobes which are required for the memories and  
2 for the microprocessor which are not shown on here.

3 A So from this drawing I cannot infer how many components  
4 would be required to provide the control and memory and input-  
5 output functions that were provided in the INTELLEC 4.

6 Q Sir, if the drawing doesn't help you then, to the  
7 extent that your memory permits you to say that where the  
8 portions of the INTELLEC 4 were dedicated -- I think your word  
9 -- to control the El Toro game, were those components a very  
10 large percentage of the components in the INTELLEC 4 or a small  
11 percentage, however you want to characterize it, sir?

12 A I don't know what percentage of the INTELLEC 4 that  
13 would be.

14 Q You don't know?

15 A No.

16 Q Sir, returning again to Exhibit 24, your affidavit.  
17 Paragraph 11, the last sentence.

18 You say: to my knowledge no tests were performed on  
19 the modified El Toro where the response of playfield switch  
20 closures to a ball in play were tested in real time other than  
21 by observation of the game during play.

22 Could you explain what you meant by that statement?

23 A That the game would be played normally and an observer  
24 would try to determine when a switch had been closed by the ball  
25 and try to determine if the score had been registered correctly.



1 the correct chime rung, things of that sort.

2 Q Sir, what was the result of those tests or observations?

3 A As I recall they indicated that the game was operating  
4 properly.

5 MR. KATZ: Objection to the question as being  
6 indefinite with respect to time frame.

7 BY MR. GOLDENBERG: sir?

8 Q Let's deal with Mr. Katz' problem. What was the time  
9 frame that you were talking about in the answer that you just  
10 gave, sir?

11 A At or near the completion of my involvement in the  
12 project where the final version of the program and the final  
13 version of the interface hardware was being used with the El  
14 Toro game.

15 Q This was just prior to the open house?

16 A As best I recall, but I do recall there were very

17 Q Did you play the El Toro game before it was modified,  
18 sir?

19 A I don't recall.

20 Q Do you recall whether any of your associates at Cyan  
21 Engineering did?

22 A No.

23 Q Do you recall, sir, after the project was completed  
24 or your work on it completed at or about the time of the open  
25 house whether anyone said it played different than it had



1 played previously?

2 A I don't recall such a comment.

3 Q Do you recall, sir, making this sketch, Exhibit 25,  
4 of the layout of the Cyan Engineering offices at Grass Valley?

5 A Yes.

6 Q Have you thought about the accuracy of that sketch  
7 since you made it, sir?

8 A Not really.

9 Q If you were to think about it now, do you believe it  
10 to be accurate as you best recall?

11 A Yes.

12 Q Do you recall any kind of area near the Cyan  
13 Engineering offices where there was some vending machines and  
14 some tables and chairs?

15 A Yes, I remember vending machines. I don't remember  
16 the specifics of that area, but I do remember there were vending  
17 machines because it was common practice to go get a Coke from  
18 them or a softdrink.

19 Q Do you recall where those machines were located with  
20 respect to the Cyan Engineering offices?

21 A I believe they were one floor down on the floor below  
22 our offices at Cyan Engineering and down a hallway.

23 Q That is your best recollection on that?

24 A Yes.

25 Q Do you recall the El Toro game ever being located at

1 or near those vending machines after modification?

2 A No. I don't recall that the machine was ever outside  
3 the Cyan office during the time when it was being used in its  
4 microprocessor-controlled form. Those offices being that  
5 portion of Exhibit 25 indicated as the two laboratories, the  
6 lobby or the offices of Larry Emmons, Steve Mayer, Ron Milner  
7 or myself.

8 Q During the open house I believe it was your testimony  
9 that the El Toro game was in the area indicated as Lab 1, is  
10 that correct, sir?

11 A I believe that I indicated I wasn't certain where it  
12 was. I thought it was either in Lab 1 or in my office.

13 Q Did the attendees at the open house other than the  
14 employees of Cyan Engineering enter the Cyan Engineering offices  
15 at any time in the course of that event?

16 A Would you repeat that please.

17 Q I made it a bit cumbersome.

18 During the open house were the attendees other than  
19 the employees of Cyan Engineering in the Cyan Engineering office?

20 A Yes.

21 Q Were they kept out of any of those offices?

22 A Not that I recall.

23 Q They could wander around?

24 A I believe so.

25 Q In the course of that wandering around they would have

1 seen the El Toro game?

2 MR. KATZ: Objection to the question as calling for  
3 speculation and being hypothetical in that your question pre-  
4 supposes something that the witness hasn't testified to.

5 You suppose, Mr. Goldenberg, that the people were  
6 wandering around. The witness said that he thought it was  
7 possible.

8 BY MR. GOLDENBERG:

9 Q Did they wander around, sir? I withdraw the previous  
10 question.

11 A To the best of my recollection the visitors from Atari  
12 had free access to all the areas within Cyan offices and  
13 wandered around, yes.

14 Q How about visitors other than those from Atari?

15 A There has been a great deal of testimony involved in  
16 who those visitors were. To the best of my recollection the  
17 only visitors were Atari employees and members of their immediate  
18 family.

19 Q When you say Atari employees, you include the Cyan  
20 Engineering people as well?

21 A Yes.

22 Q Did those visitors and members of the immediate families  
23 as you put it, were they in the Cyan Engineering office in the  
24 course of the open house?

25 A Yes.

1 Q Were they prohibited from going into any of the offices  
2 in the course of that open house?

3 A Not that I recall, no. I was under the impression  
4 that they had free access to all of the offices.

5 Q I believe it is your testimony you don't recall  
6 whether or not any of those visitors played the El Toro game,  
7 is that correct?

8 A Yes.

9 Q Was the El Toro game hidden from view during the  
10 open house?

11 A No, I don't believe so, no.

12 Q Who arranged the open house, sir?

13 MR. KATZ: Objection to the question as lacking  
14 foundation.

15 A I don't know.

16 BY MR. GOLDENBERG:

17 Q You didn't do it, did you?

18 A No, I didn't.

19 Q You didn't extend invitations, did you?

20 A No, I did not.

21 Q Except to your own immediate family?

22 A Yes.

23 Q Do you recall during the occasion of the open house  
24 or that portion of it that took place in the Cyan Engineering  
25 laboratories, were there other games in existence other than

1 the El Toro game modified?

2 A Yes, there were.

3 Q Could you tell me what those other games were, sir?

4 A There was a version of the road racing game which was  
5 a video game where a car was driven around a racetrack.

6 There was another game in development called Quack  
7 which had ducks and birds flying across the CRT with a light  
8 rifle which was used to shoot them. I think that was on  
9 display. There may have been others which I don't recall.

10 Q Were any of those other games played by the visitors?

11 A I don't recall. To the best of my recollection all  
12 the games were on display and were operating and were available  
13 for the visitors to play. I am not trying to indicate that they  
14 weren't played. I just don't recall specifically seeing the  
15 games played.

16 Q Wasn't that one of the purposes of the open house to  
17 your understanding: to show the work being done at Cyan  
18 Engineering?

19 A Yes.

20 Q The work that was being done at Cyan Engineering was  
21 the creation of electronic games of one kind or another?

22 A Yes.

23 Q So they were there for people to play, weren't they,  
24 on the occasion of the open house?

25 A Yes.

1 Q Page 3 still of your affidavit in paragraph 13 the  
2 sentence that starts at the bottom, could you read that.

3 A (Reading): It was my understanding that everyone  
4 present understood that all information learned at the open  
5 house was to be kept strictly company-confidential.

6 Q I believe it is your testimony earlier that the basis  
7 for that understanding was that Steve Mayer instructed you and  
8 others to that effect?

9 A Yes.

10 Q Would it surprise you, sir, if Mr. Mayer says that he  
11 recalls no such event?

12 A No.

13 Q So it may or may not have happened?

14 MR. KATZ: Objection to the question as trying to put  
15 your words in his mouth.

16 MR. GOLDENBERG: That is unsanitary, and I never do  
17 that.

18 MR. KATZ: We have seen differently, Mr. Goldenberg.

19 A To the best of my recollection that warning took  
20 place. Steve Mayer's recollection is what it is. It may or  
21 may not be accurate.

22 MR. KATZ: I object to the question further on the  
23 basis that there is no evidence that I am aware of that indicates  
24 what Mr. Mayer said or didn't say about that subject.

25 As far as I know, Mr. Goldenberg, it is merely an

1 attempt to intimidate the witness by supposing that Mayer would  
2 say something or not say something.

3 BY MR. GOLDENBERG:

4 Q What time of the day did the visit to the laboratory  
5 occur on the day of the open house?

6 A Late morning as I recall it.

7 Q That occupied about two hours?

8 A Or less.

9 Q How much less?

10 A I don't recall the specific length of time of the  
11 visit. I would say between one and two hours.

12 Q You yourself had played El Toro, the modified El Toro  
13 game, had you not?

14 A Yes.

15 Q More than once?

16 A Yes, many times.

17 Q Did you come to any view as to whether or not the  
18 project was successful at that time?

19 A I could only judge success based on the objectives I  
20 was aware of for the project. Based on the knowledge that I  
21 had of the objectives it was successful.

22 Q What were the objectives, sir?

23 A To make a microprocessor-controlled El Toro that  
24 played as much like the electromechanical version as possible.

25 Q I notice in the affidavit, Exhibit 24, paragraph 13,

1 you say the open house was limited to members of the immediate  
2 families of Atari and Cyan Engineering.

3 Are you sure of that, sir?

4 A To the best of my recollection, yes.

5 Q So it is strictly your recollection, that is all you  
6 have at the moment?

7 A Yes, all I have is my knowledge of those events.

8 Q You don't know whether or not someone came with a  
9 girl friend or a boy friend?

10 A I don't recall any boy friends or girl friends, but  
11 I can't state that they weren't there.

12 Q At this meeting that you had with Mr. Mayer where  
13 this discussion was given about secrecy, who else was there?

14 A I don't recall.

15 Q Do you recall the number of people that were there?

16 A No.

17 Q When did it occur?

18 A Within one to two weeks prior to the open house.

19 Q What time of the day?

20 A I don't recall.

21 Q Precisely what was said, sir?

22 A I don't recall the specifics of the conversation.

23 Q What was the essence of what was said?

24 A That we would have visitors to the laboratory, to  
25 the Cyan offices coming from Atari, it would be Atari employees



1 and their families, that they were to be greeted cordially.

2 We were to be friendly. We were to keep in mind  
3 that the work we were doing here was confidential, that the  
4 Atari employees were aware of that policy and that we were to  
5 provide assistance to them as necessary.

6 Basically that the proprietary information in the  
7 company would be secured as best I recall it, drawings put away  
8 and things of that sort.

9 Q Was any specific thing identified as proprietary and  
10 confidential?

11 A Nothing specifically any more than any other, no.  
12 All the work that we did there was considered proprietary.

13 Q Did you ever get visitors in the Cyan Engineering  
14 offices, salesmen?

15 A Yes, in the laboratory area.

16 Q They were never permitted in the office?

17 A They would be permitted within the lobby and the  
18 office spaces of Larry Emmons, Steve Mayer, Ron Milner and myself.

19 Q Never in the laboratory?

20 A Not to the best of my recollection.

21 Q What was the purpose of the open house?

22 MR. KATZ: Objection to the question. You already  
23 asked him that.

24 A You already stated what the purpose was.  
25

1 BY MR. GOLDENBERG:

2 Q Tell me what I stated, sir.

3 A As I recall the purpose that you stated was to acquaint  
4 the Atari people with the work that was being done at Cyan and  
5 with the facilities there which is an accurate portrayal of  
6 the open house as I recall it.

7 Q And the members of their immediate families as you  
8 put it in your affidavit, isn't that true?

9 A Yes.

10 MR. KATZ: I want to enter a belated objection to  
11 that question --

12 MR. GOLDENBERG: Let's have one of those.

13 MR. KATZ: -- to that question with respect to the  
14 purpose as lacking foundation with respect to whose purpose,  
15 whether or not Mr. Cox knew what the corporate purpose of the  
16 open house was because there has been no showing that he knew.

17 BY MR. GOLDENBERG:

18 Q Directing your attention to Exhibit 25 once again.  
19 Do you recall a hall extending perpendicular essentially to  
20 the offices of Cyan Engineering?

21 A Yes.

22 Q Is that hall shown in your drawing?

23 A No. The purpose of the hall shown on the drawing was  
24 to indicate where the external wall, external boundaries of  
25 the Cyan offices were, not to show the structure of the building.

1 Q So the drawing isn't quite accurate, is it?

2 A It is an accurate portrayal of the Cyan offices as I  
3 recall them.

4 Q But not an accurate portrayal of the hall arrangement?

5 A No, I was not trying to draw a building plan.

6 Q I believe in the course of questions by Mr. Leach  
7 you identified a student technician by the name of Bob?

8 A Yes.

9 Q Do you know what Bob's last name was?

10 A I don't recall.

11 Q Do you know what institution he was attending? You  
12 say he was a student.

13 A As I recall he just graduated from the local high  
14 school and was scheduled to attend college in September. I  
15 don't recall which college.

16 Q If you would turn your attention to Exhibit 14 which  
17 is your declaration.

18 Read any portion of it that you wish, sir, but I  
19 particularly direct your attention to paragraph 5.

20 A Yes.

21 Q Sir, this switch debounce problem that you refer to  
22 in the early part of the paragraph, how did you happen to  
23 observe that problem, sir?

24 A During tests where the ball was rolled against the  
25 switches we would detect multiple responses to the switch

1 closure, in other words, multiple accumulations of scores and  
2 ringing of the chimes.

3 Q That meant to you that the switch was closing several  
4 times in response to one activation by the ball?

5 A Yes.

6 Q You cured that problem by revising the program  
7 slightly, is that correct, sir?

8 A Yes.

9 Q You essentially did that by building in a time delay?

10 A Yes.

11 Q Do you consider that a difficult thing to do?

12 MR. KATZ: Objection to the question.

13 BY MR. GOLDENBERG:

14 Q Let me add to it. At the time you did it, sir.

15 A Moderately difficult within the restrictions placed  
16 upon the software development.

17 Q What were those restrictions?

18 A The use of only the registers for scratch pad memory.

19 Q What event or person or thing placed those restrictions?

20 A Steve Mayer.

21 Q Why did he do that? Did he tell you?

22 A He did not want to use RAM memory because of the  
23 increased cost of implementation should the design be committed  
24 to production game.

25 Q So those were economic restrictions?

1 A Yes.

2 Q How long did it take you to solve the debounce problem?

3 A I don't recall specifically. Probably two to three  
4 days.

5 Q Directing your attention to paragraph 6 of Exhibit 14,  
6 take your time and read it, sir.

7 A Okay.

8 Q You have read the paragraph?

9 A Yes.

10 Q Did you consider at the time you worked on the El Toro  
11 project that it was a difficult task requiring a significant  
12 technological break through in order to accomplish?

13 A No, I don't believe I felt that way.

14 Q Was it more like the good application of good  
15 engineering and technical skills?

16 A More in the nature of development of applications for  
17 new integrated circuit devices, microprocessors, memories.

18 Q The devices were there -- were they or were they not?

19 A -- and were new and had not been used broadly in any  
20 application and by none of these people or myself in this  
21 specific application.

22 Q The new devices you are talking about are the micro-  
23 processor?

24 A And its support circuits, yes.

25 Q You had not used them before?

1 A That's correct.

2 Q To your knowledge your fellow employees at Cyan  
3 Engineering had not used them before, is that correct?

4 A That's correct.

5 Q You began the project when?

6 A Shortly after I joined Cyan Engineering in March of  
7 1974.

8 Q The initial part of your work on the project was to  
9 become familiar with the INTELLEC 4 system, was it not?

10 A Yes.

11 Q That occupied how much time?

12 A Several weeks.

13 Q When did you actually begin work on the El Toro  
14 project as such?

15 A Approximately two weeks after I initiated employment.

16 Q After you did what, sir?

17 A Initiated employment with Cyan Engineering.

18 Q So the first couple of weeks were devoted to becoming  
19 familiar with the INTELLEC 4 system?

20 A Yes.

21 Q Therefore you began work on the El Toro itself some-  
22 time between the middle of April and the end of April?

23 A No, I joined the company at the beginning of March.  
24 It would have been sometime between the middle of March and  
25 the end of March.

1 Q The project itself was complete the day before the  
2 open house or the week before or what, sir, according to your  
3 recollection?

4 A I don't recall the specific timing relationship  
5 between the completion of the project. It was in a state where  
6 the El Toro machine could be played with INTELLEC 4 controlling  
7 it without improper machine operation for at least one to two  
8 weeks prior to the open house.

9 The specific time period I don't recall.

10 Q Let's see if this seems right to you. Based on that it  
11 would seem that the project required about two months of actual  
12 work?

13 A That's about right.

14 Q Were you working normal hours during that period?

15 A Yes.

16 Q What were normal hours?

17 A Eight hours a day, 8:00 to 5:00.

18 Q Five days a week?

19 A Yes.

20 Q No overtime?

21 A No.

22 Q Did you have a view at that time as to whether or  
23 not that was an extraordinary amount of time required for that  
24 project?

25 A I felt it was a reasonable amount of time.



1 Q I am directing your attention to paragraph 9 on page  
2 3 of Exhibit 14.

3 A Yes.

4 Q Let me ask you also to read paragraph 8.

5 A Yes.

6 Q How was this policy of secrecy strictly enforced?

7 A When I reported to work I was given an employment  
8 agreement to sign and was told that all employees had to sign  
9 such an agreement. This agreement called for certain obligations  
10 on the part of the employee to not disclose the results of any  
11 work, to not accept employment for a competitor for a period of  
12 seven years, to not go into or operate a competitive business  
13 for a period of seven years.

14 Various other stipulations regarding the position of  
15 the employee as a potential competitor to Atari in the future.

16 Part of that agreement dealt with the confidentiality  
17 of the information as I recall it and the nondivulgence of  
18 information.

19 Secondly I was given verbal warnings, briefings on  
20 multiple occasions indicating that this was the company policy,  
21 that the security procedures in the company very strongly  
22 reinforced that policy.

23 Q Can you tell me something, sir, with all that, why  
24 was it that when Mr. Schnayer or Mr. Katz got in telephone  
25 conversation with you you started to tell them about all the

1 things that had occurred?

2 A I told them about events that occurred which were  
3 independent of the specific technical development covered by  
4 the proprietary rights of the agreement I signed and of the  
5 understanding of my employment. The only technical information  
6 I gave them was as a result of my analysis of the documents  
7 which they provided and did not disclose any proprietary or  
8 technical information to them outside the limits of the informa-  
9 tion they provided to me.

10 Q Did you ever question their right to have those  
11 documents that they showed you?

12 A No, I did not.

13 Q Why not?

14 A Because they had been entered as exhibits in Court  
15 proceedings.

16 Q How did you know that?

17 A Because they were marked as such and Mr. Schnayer told  
18 me that they had been designated as exhibits.

19 Q You believed him?

20 A Yes.

21 Q Did you make any telephone inquiries of Cyan personnel  
22 or Atari personnel to see whether or not you should discuss  
23 these matters with anybody?

24 A As I stated previously I called Steve Mayer after I  
25 was originally contacted by Mr. Schnayer and asked him if he

1 was aware of these proceedings and if they were legitimate.  
2 He indicated they were.

3 I inferred from that conversation that since Mr.  
4 Schnayer's firm was a member of these proceedings that he had  
5 a right to those exhibits.

6 Q In your conversations with Mr. Schnayer prior to  
7 giving your deposition, who brought up the matter of secrecy  
8 at Cyan Engineering? Was it you or was it he?

9 A I don't recall specifically who brought it up.

10 Q It was Mr. Schnayer, wasn't it?

11 A Possibly.

12 Q No question about it?

13 MR. KATZ: Objection to the question.

14 A If there was no question about it I would have  
15 answered your earlier question as to who brought it up first.  
16 BY MR. GOLDENBERG:

17 Q I am asking you to think about it.

18 A I have thought about it.

19 Q It was Mr. Schnayer, wasn't it, very possibly, wasn't  
20 it?

21 A I stated that possibility.

22 Q It was Mr. Schnayer that wanted you to make a big  
23 issue out of it in your affidavit and declaration, wasn't it?

24 A No, it was not.

25 Q You thought to put that in there?

1 A He wanted the issue of confidentiality addressed, and  
2 I endeavored to make it clear just what that policy was.

3 Q Just being helpful, weren't you?

4 A You bet.

5 Q That is what I thought.

6 In paragraph 9 you make reference to a special  
7 burglar alarm system.

8 Was that burglar alarm system exclusively for the  
9 Cyan Engineering offices, or was it for the entire set of  
10 offices at Grass Valley?

11 A As I recall it there were two. There was one that was  
12 specifically exclusive to the laboratory area which was an  
13 alarm located in the area of Lab 2 which also covered the area  
14 of Lab 1 and detected motion of any person in that area that  
15 was specifically for the Cyan office area.

16 There was a second burglar alarm system which was the  
17 normal contact-type alarm system which would register a broken  
18 window or open door. I'm not certain whether that was a building-  
19 wide system or specifically to the Cyan Engineering area.

20 Q The guards that you make reference to, did they just  
21 patrol the Cyan Engineering office or did they patrol the  
22 entire building?

23 A They patrolled the entire building to my understanding.

24 (Recess taken.)  
25

## AFTER RECESS

MR. GOLDENBERG: I have no further questions.

BY MR. KATZ:

Q Mr. Cox, in your direct testimony you indicated that your consulting rate, that is the rate you are charging, for the time spent in connection with this matter was initially \$50 an hour, is that correct?

A Yes.

Q What was the basis for your charge at that rate?

A At that time I had a friend doing some consulting work, software consulting work for some firms in California. He was charging \$50 an hour. I thought that was indicative of a market rate for software consulting services.

Q With respect to your rate at the \$75 an hour which you later charged, what was the basis for that?

A The consulting work became more of a nuisance after the move to State College, and I was not too interested in continuing it. I felt the traffic would bear a higher rate, so to discourage it I raised the rate.

Q With respect to page 2 of Deposition Exhibit 23, if you would turn to that.

A Yes.

Q I refer you to the handwritten notes near the top and ask you are those notes in your handwriting?

A Yes, they are.

Q For clarity of the record, could you read those notes. I believe it starts with the resultant --

A A sentence was added to the end of paragraph 5 which reads: resultant data from these discussions were used by Steve Mayer and Greg Cox -- those names are abbreviated by initials -- in the design of the El Toro prototype control circuits.

Then paragraph 6 was modified to read: Steven Mayer who was also an employee of Cyan Engineering and I were involved the discussions referenced in paragraph 5 above.

Q Then you wrote the material; that is your handwriting?

A Yes.

It is the discussions. It should have been in the discussions.

Q To clarify a question I have in my mind, in your direct examination by Mr. Leach when you refer to the so-called open house at Cyan, is it correct that you were referring to both the picnic portion and the lab tour?

A Yes.

Q With respect to Exhibit 25 which is the floor layout I believe that you made during the direct examination, do you recall what kind of flooring material -- that is, linoleum, carpeting, et cetera -- was actually present in the Laboratory Number 1?

1 A It was vinyl floor as I recall it.

2 Q Vinyl floor?

3 A Yes.

4 Q Was it the same in Laboratory Number 2?

5 A Yes.

6 Q Was that the same type of material used for the  
7 flooring in the entire office section?

8 A I am not certain. The lobby and office areas may  
9 have been carpeted. I can't recall, but I do remember that  
10 the laboratories had vinyl floor.

11 Q During your work at Cyan, had you ever encountered  
12 any static noise problems with respect or in connection with  
13 any of the games that you worked on or projects that you worked  
14 on?

15 A No.

16 Q Have you ever had occasion to form any opinion or  
17 conclusion with respect to the lack of noise problems in  
18 connection with the development of those games or projects that  
19 you worked on?

20 A Electrostatic noise?

21 Q Yes, electrostatic noise.

22 A Well, yes. I was there during a reasonably temperate  
23 part of the year. Temperatures were not too hot or too cold.  
24 Humidity levels tended to be reasonably low.

25 From my personal experience wool carpeting seems to



be one of the largest contributors to electrostatic charge build-up. I don't believe there was any wool carpeting in the area.

I guess I felt that it was a fairly static-free noise environment.

Q Did you encounter any other kind of electrical noise problems on any of the projects that you worked on at Cyan?

A There were several occasions where we encountered interference or noise problems due to the locations of devices on the circuit board or the locations of wires, normal electronic design noise problems. There were several occasions.

Q Were those types of noise problems the result of noise generated internal to the device itself?

A Internal to the circuits, yes.

Q Did you ever encounter any noise problems on any project generated by some external source, something external to the circuit itself?

A Not that I recall.

Q To the best of your recollection what was the material for the flooring in the offices, in your own office, do you recall?

MR. GOLDENBERG: Asked and answered. Objection.

A I'm not certain. I think it was vinyl flooring, but it may have been carpeted. It may have been some sort of a nylon carpeting.

1           A       If it was a carpet, it was a denser low pile carpet.  
2 I don't recall a long pile carpet.

3 BY MR. KATZ:

4           Q       Do you remember any carpet?

5           A       No. I think it was vinyl, but I can't be certain.

6           Q       With respect to your notes produced which were  
7 marked as Exhibit 7, did you make this note in the upper  
8 right-hand corner of the document which refers to I believe  
9 to Gottlieb & Company?

10           A       It is not too legible in the copies.

11           A       Acting as a friend of Gottlieb & Company is what it  
12 says.

13           Q       Did you make that note; is that your writing?

14           A       Yes, I did.

15           Q       What occasioned your making that note?

16           A       That was made during a telephone conversation with  
17 Steve Mayer. He indicated that was Atari's position with  
18 respect to the proceedings which Mr. Schnayer was associated  
19 with.

20           A       This was on the occasion of the telephone call to  
21 Steve Mayer after I had been initially contacted by Gerry  
22 Schnayer.

23           Q       Did he say anything more in that regard, in regard to  
24 Atari acting as a friend of Gottlieb in connection with these  
25 proceedings?

A Only that they were not a direct participant.

Q Did he say anything with respect to Atari's position vis-a-vis Bally's position?

A He indicated that Gottlieb and Bally were on opposite sides of the proceedings of the suit and that Atari was not a participant so they would not have a legal relationship to either Bally or Gottlieb to the best of my understanding.

Q Did he state any understanding or make any statement indicating what he thought Bally's position in the proceedings was?

A Not that I recall.

Q Further down in your notes I see it says -- here is the original that Mr. Goldenberg has kindly provided -- after Steven Mayer it says June, 1978. Did you write that?

A Yes.

Q What occasioned your writing that?

A I believe that was from the results of my telephone call with Gerry Schnayer where he indicated Bally had received a patent for microprocessor control for pinball circuits in June of 1978 based on work that was done in 1973 and 1974 relating to the position of Bally in the lawsuit.

Q Was this note then occasioned by your conversation with Mr. Schnayer and not Mr. Mayer?

A I believe so, yes.

Q At the open house were you present in the Cyan

1 facilities during the tour portion of the open house?

2 A Yes.

3 Q Were you present during the entire one to two hour  
4 period that you indicated that portion took?

5 A To the best of my recollection. I may have left for  
6 a few minutes to get Cokes or softdrinks, but other than that  
7 I was there continuously.

8 Q From looking at the El Toro pinball set-up which you  
9 indicated was involved in the El Toro pinball machine and the  
10 INTELLEC 4 and this interface unit, could an observer determine  
11 what the architecture of the computer system was from seeing  
12 it at the open house?

13 MR. GOLDENBERG: Objection, relevancy, nor is it  
14 reasonably calculated to lead to the discovery of admissible  
15 evidence.

16 A It would have been obvious that the system was  
17 controlled by an INTEL 4004 microprocessor, but other than that  
18 the details of the implementation would not have been obvious.  
19 BY MR. KATZ:

20 Q That would have only been obvious if one were to  
21 know that there was a 4004 INTEL microprocessor in the micro-  
22 processor system?

23 MR. GOLDENBERG: Objection, leading.

24 A Yes.  
25

1 BY MR. KATZ:

2 Q Would the programming used to implement the system  
3 have been apparent to any observer at the open house?

4 MR. GOLDENBERG: Objection, leading.

5 A No.

6 BY MR. KATZ:

7 Q In the INTELLEC 4 development system as it was  
8 employed with the El Toro, was there any random access memory  
9 used in the INTELLEC to function as RAM, as random access  
10 memory?

11 A Yes.

12 Q How was that used?

13 A The INTELLEC 4 contained two types of memories. It  
14 contained a RAM memory which was intended to function as a  
15 RAM memory would in a dedicated microprocessor application.

16 Then there was a RAM memory which was intended to  
17 function as a ROM memory would in a dedicated microprocessor  
18 application.

19 The RAM memory functioned as a dedicated RAM was not  
20 used.

21 Q Wasn't that used in the --

22 A El Toro software implementation.

23 Q But the RAM that was intended to function as ROM was  
24 used, is that correct?

25 A Yes.

1 Q In the wiring of the El Toro pinball machine after it  
2 was modified to operate with the INTELLEC 4, do you know  
3 whether the switches were actually wired in a matrix under the  
4 playfield of that machine?

5 A I don't know where the matrix logic was. I don't  
6 know whether it was in the interface circuit card that was  
7 external to the El Toro enclosure or within it. I don't recall.

8 Q Do you remember a cable coming from the El Toro pin-  
9 ball machine to the interface card?

10 MR. GOLDENBERG: Objection, leading.

11 A Yes.

12 BY MR. KATZ:

13 Q Do you know how many wires there were on that cable?

14 A I don't recall.

15 Q Do you remember what type of cable it was, if any,  
16 could you describe that type of cable?

17 A I don't recall what it was like.

18 Q Do you remember how it exited or passed through --  
19 strike that.

20 Did the cable pass through the cabinet of the El Toro  
21 machine?

22 A Yes.

23 Q Do you remember where it passed through the cabinet?

24 A I think it came through the back in a hole cut in  
25 the cabinet, but I am not certain.

Q Do you remember if all of the wires in the cable were the same color?

A I don't recall.

Q Do you recall whether that was sort of a home made cable as distinguished from a cable that one would purchase already assembled, a ribbon cable that is manufactured.

MR. GOLDENBERG: Objection, leading.

A It was custom made from individual pieces of wire as I remember.

BY MR. KATZ:

Q Was it laced?

A Partially.

Q What do you mean by that?

A Well, I don't recall the specifics. I do remember that the wiring under the playfield was a real rats nest. It was a mess. There was some attempt to try and straighten the wires out with lacing to try and hold groups of wires together.

It seems to me that there was a significant number of wires -- 20 to 50 -- some reasonably large number of wires connecting the interface unit to the El Toro enclosure, and those were grouped together, laced together from where they exited the cabinet of the El Toro machine till where they connected with the interface unit box.

But it was not an elegant or professional-type cable.

Q From the interface unit to the INTELLEC 4, I believe



you indicated on direct testimony that that was a ribbon cable, is that your recollection?

A Yes.

Q On examination by Mr. Goldenberg at our last session I believe you indicated that when you were working on a gambling-type of game which we referred to as a game box and you wanted to use the INTELLEC 4 to operate with that game box, that it was not a difficult task in that the only change that was necessary was to disconnect the ribbon cable from the interface unit and reconnect it to the game box.

Do you recall that testimony?

A Yes.

Q Would anything else have to be done to the INTELLEC 4 unit if you were to use it to operate the game box after having just used it to operate the El Toro pinball set-up?

A The game box software program would have to be loaded into the INTELLEC 4 memory.

Q In what form was the game box programmed?

A The programs were typically stored on an input medium of punched paper tape and read into the INTELLEC 4 via the teletype tape reader.

Q Approximately how long would it take to load the punch paper program of, let's say, the El Toro program into the development system?

A Maybe 20 minutes.

1 Q Was the teletype tape reader unit normally kept in  
2 proximity to the El Toro development set-up when you were  
3 working on it?

4 A Yes.

5 Q At the open house do you recall whether the paper  
6 tape reader was also present at that set-up?

7 A I believe it was.

8 Q How big a unit was the teletype? Approximately the  
9 size of a normal teletype terminal?

10 A Yes. It was a standard teletype terminal approxi-  
11 mately 16 to 18 inches wide and 32 inches tall, 20 inches deep.

12 Q So is it correct then that whenever you were going  
13 to use the INTELLEC 4 for operation with the El Toro project it  
14 was necessary to load the paper tape program into the INTELLEC  
15 4 through the teletype reader?

16 MR. GOLDENBERG: Objection, leading.

17 A Yes.

18 BY MR. KATZ: That I recall.

19 Q At any time during your work on the El Toro pinball  
20 project at Cyan did you ever have any discussions with Steven  
21 Mayer concerning any aspects of his hardware design?

22 A Yes.

23 Q What were those discussions concerning?

24 A We discussed the general architecture of the hardware  
25 implementation that he was developing with regard to the methods

1 employed for operating the hardware within the El Toro game,  
2 the lights, the switches, the solenoids, chimes and so forth.

3 Q Did you ever have any disagreements with him with  
4 respect to in your view how any particular aspect of the hard-  
5 ware design should be implemented?

6 A Yes, specifically over the implementation of the  
7 switch sensing. I felt it would be more straightforward and  
8 direct to use a direct poling scheme on the switches rather  
9 than a matrix scheme that was tied to the 120 hertz cycle.

10 The implementation used made the switch sensing, the  
11 light control and the LED score refreshing all interdependent  
12 which imposed significant restrictions on the software design.  
13 I discussed the possibility of making those functions  
14 independent with Steve Mayer.

15 Q Were there any other differences in views concerning  
16 any other portions of the hardware system relating to the  
17 digital displays or the lamps?

18 A Not that I recall. I did want to use RAM memory as  
19 a scratch pad area but was advised to limit the scratch pad  
20 area to that available in the registers.

21 Q In connection with your view of what principals should  
22 be used for the hardware relating to the switch poling which I  
23 believe you were discussing in your last answer, do you recall  
24 what Mr. Mayer's views were concerning that portion of the  
25 hardware design?

1 MR. GOLDENBERG: Objection, hearsay.

2 A Yes. We discussed that the implementation I preferred  
3 to have required additional circuits at increased cost. Since  
4 minimal cost was one of the objectives of the implementation  
5 it was decided that that scheme would only be used if the scheme  
6 that was actually implemented would not work, could not be made  
7 to work.

8 BY MR. KATZ:

9 Q Was there any discussion concerning the use of multi-  
10 plexing for the digit displays, discussion with Mayer?

11 MR. GOLDENBERG: Objection, leading.

12 A Yes. I had expressed the position that it would be  
13 easier to develop the software and make a more straightforward  
14 program if the LED displays could be controlled independently  
15 from the 120 hertz AC cycle which would make it independent from  
16 the switch sensing and the playfield light control.

17 Again I got the same argument that minimum hardware  
18 implementation was the objective and the multiplexing scheme  
19 that was implemented would be used.

20 Q As far as you knew was it Steven Mayer who had the  
21 final say on what the hardware design was that was actually used  
22 to implement the El Toro pinball project?

23 A Yes.

24 Q Could I see Exhibit 26.

25 This was a document I believe that you referred to

1 on direct examination by Mr. Leach in our second session I  
2 believe.

3 Is this document entirely in your handwriting if you  
4 can tell?

5 A No, I don't believe so. There appear to be at least  
6 annotations on it that aren't in my handwriting.

7 Q What are those annotations?

8 A Well, I'm not sure. Give me another minute to look  
9 through.

10 Q Sure, take your time.

11 A On page 6, for example, there is notations above the  
12 various entry points in the subroutines. I am not certain  
13 whether it is my handwriting or not. It looks somewhat different,  
14 but somewhat similar. I can't be certain.

15 MR. GOLDENBERG: I just want to be sure we are looking  
16 at the same page.

17 A Yes.

18 MR. GOLDENBERG: Thank you.

19 A The page with switch service routines on the top.

20 BY MR. KATZ:

21 Q Could you point to specifically what you are referring  
22 to, what comment or notations you are referring to?

23 A The title switch service routines and the comments  
24 below it. Indirect entries and the various indicators which  
25 are written outside ovals or diamonds or boxes.

For instance, in the top left-hand corner slingshots and then to the right of that in parentheses activate SS solenoid.

Below that thumper bumpers. Below that E roll-over. Below that L roll-over.

And so forth throughout the page and the next page after that.

The writing appears similar to mine but not exactly the same. I can't recall whether I made those comments on the page or not.

I guess I can't be certain that either the writing is all mine or that there are comments inserted by someone else. I can't be certain either way. In places the handwriting does appear different though.

Q Can you identify what those documents are, Exhibit 26?

A It is a flow chart.

MR. GOLDENBERG: Objection, asked and answered.

MR. KATZ: When did I ask it?

MR. GOLDENBERG: Mr. Leach asked it.

MR. KATZ: You can't ask the same question on cross examination of a witness?

MR. GOLDENBERG: I don't think you should. I think you should progress beyond that. If you enjoy doing that kind of a thing I will sit here quietly up to a point.

A It is a flow chart of a version of the El Toro pinball

1 software as best I can tell. I could not be specific as to  
2 which version this represents.

3 BY MR. KATZ:

4 Q Is it correct that you can't tell whether that is the  
5 version at the open house or sometime prior to the open house  
6 during the development?

7 A That's correct.

8 Q Let me show you this colored glossy reproduction that  
9 has been previously marked in a deposition as Exhibit GD-56 in  
10 which those fragments of broken Xerox copies marked in this  
11 deposition as I believe 21.

12 MR. GOLDENBERG: Mr. Katz, so there is no question  
13 about it, Exhibit 21 is GD-56 cut up into four parts. You  
14 characterized it as fragments.

15 MR. KATZ: I'm sorry. I believe it was made by  
16 Xeroxing GD-56 8-1/2 by 11 at a time.

17 MR. GOLDENBERG: And therefore represents GD-56.

18 BY MR. KATZ:

19 Q If you paste it back together it should come out  
20 except it is not in color as GD-56 is a color reproduction of  
21 the expensive variety.

22 Have you ever seen the original drawing of GD-56  
23 prior to the time Jerry Schnayer showed it to you?

24 In other words, have you ever seen this drawing?

25 Now I am not talking about GD-56, but the original schematic



which was copied as GD-56. Had you ever seen that prior to the time that Jerry Schnayer showed you this particular color reproduction?

A I believe so. There was a schematic which appeared identical or very similar which was the working schematic for the El Toro pinball electronics. This appears to be that schematic.

Q Do you have any independent recollection that the circuitry depicted in GD-56 was actually the circuitry used in the El Toro development set-up as operated with the INTELLEC 4?

A Yes, I recall the basic architecture of the hardware as it is shown here.

The control interfaces between the microprocessor circuits and the interface circuits shown in this schematic are also the same ones used in the software so that those interfaces support this as being the schematic used for the El Toro.

Q Do you have a specific recollection, for example, do you know -- and I have picked out a chip at random -- do you know if a 9312 chip was used here as shown under the 4004? Do you know if that chip was actually used, the 9312?

A No, I don't recall the specific chips that were used.

Q Or here if we pick a NAND gate, a 4001 chip, do you know if that was actually used?

A Yes, I know that 4001, 4002 chips were used. I can't

recall the specific implementation of all the gates and chips in the circuit.

Q For example, do you recall here there is a chip designated 3-B and it is a 7442.

Do you recall if that was actually the chip designated that was used in the actual physical implementation?

A I don't remember.

Q It is correct, is it not, that while you recall the architecture generally you don't recall the specific gate and chip designations that were actually used?

MR. GOLDENBERG: Objection, lack of a foundation. That is not in accord at all with what the witness said. He specifically identified some chips that were used and he recognized on the drawing. Some he did recognize, some he did not.

A Would you repeat the question.

(Question read by reporter.)

A I recall some of the device nomenclatures that were used, such as, 4001, 4002. I don't recall the specifics of their implementation in terms of the individual utilizations for each gate or logic section within the integrated circuit.

The schematic is very familiar in that the architecture of the switch sensing I recall. I recall the architecture of the light control circuits, the architecture of the LED control circuits.

1           The schematic has a very general visual impression  
2 that is very familiar.

3           Q     In connection with your work on the El Toro pinball  
4 project at Cyan, do you recall whether there was ever any  
5 discussion of any attempts to design a microprocessor system  
6 that would be useful with any pinball machine rather than  
7 specifically with the El Toro?

8           MR. GOLDENBERG: Objection, leading.

9           A     You mean, a general purpose-type program that could  
10 accommodate various playfields and various game configurations?

11 BY MR. KATZ:

12          Q     Or hardware system.

13          MR. GOLDENBERG: Objection, leading.

14          A     No, I don't recall such discussions.

15 BY MR. KATZ:

16          Q     Do you recall when you were first shown a sketch of  
17 any hardware system for the pinball project at Cyan?

18          A     I don't recall a specific event of seeing the sketch  
19 for the first time although I am certain it happened.

20          Q     Do you recall whether it was after you had the  
21 development system, the INTELLEC 4 development system?

22          A     I think it was before the INTELLEC 4 arrived.

23          Q     Do you recall, do you have any specific recollection  
24 of the occasion when you first saw a sketch or any drawing of  
25 the hardware system?

1 A No.

2 Q Do you know if the drawing that we were discussing --  
3 GD-56 or a sketch very similar to that -- was the first sketch  
4 that you saw of a hardware system for the pinball project at  
5 Cyan?

6 A No, I don't believe that was the first drawing. I  
7 think the first drawings were in bits and pieces, the various  
8 portions of the schematic were done independently and then  
9 later compiled together on a single sheet as a single drawing.

10 I think the early schematic, the early designs were  
11 for portions of the electronics.

12 Q Do you have any recollection of any revisions in  
13 those drawings from one portion to the next or one sketch to  
14 the next?

15 A Yes, there were revisions. I don't remember the  
16 details of what those revisions were.

17 Q Who was in charge of making those revisions?

18 A Steve Mayer.

19 Q Did anyone else work with him to your knowledge on  
20 the hardware system?

21 A He had discussions with Larry Emmons and Ron Milner  
22 and certainly the technicians on the schematics and the hard-  
23 ware implementation, but I can't say that those other people  
24 had a hand in the design or the implementation because I don't  
25 know if they make specific contributions on the circuit designs.

My general impression was that Steve Mayer did the design essentially by himself.

If he had any assistance it was minimal.

Q With respect to those people at Cyan whom you were familiar with --

A Yes.

Q -- on direct examination today by Mr. Goldenberg you indicated that you encountered a problem of switches stuck in a closed position that you would have attempted to correct it within the program, do you recall that testimony?

A Yes.

Q Do you know for certain that you could have corrected the problem within the program given the specific hardware system that was used and the debouncer requirements that were necessary?

A No, I don't know that that could have been done. On the contrary, it might not have been possible because there was no RAM memory used in that implementation.

Q With respect to testimony concerning your experience with noise problems that you encountered at other jobs before you went to work for Cyan, do you think that it is a correct characterization that the solution to such noise problems is more of an art than a science?

MR. GOLDENBERG: Objection, leading.

1 BY MR. KATZ:

2 Q I am talking about noise problems in general.

3 A No. In general I think solutions to noise problems  
4 fall into the realm of scientific rather than artistic. It  
5 is generally controlled by an understanding of circuit board  
6 layout and electrical design procedures and criteria.

7 Q Isn't that often the case, that the solution to noise  
8 problems from your experience are often a plague to the  
9 designers and often give much trouble in terms of locating the  
10 source and then coming up with a cure?

11 MR. GOLDENBERG: Objection, leading.

12 A Yes, generally that is true. They tend to be  
13 difficult to find. Generally impact the design to rectify.

14 BY MR. KATZ:

15 Q Referring to your affidavit, Exhibit 23, paragraph  
16 11, the last sentence where you state that to my knowledge no  
17 tests were performed on the modified El Toro where the response  
18 of playfield switch closure to a ball in play were tested in  
19 real time other than observation of the game during play.  
20 By the term observation, were you referring to your observation  
21 of the game or someone else's observation?

22 A Both.

23 Q Other than yours, who were the other observers to  
24 whom you make reference, if you recall?

25 A Steve Mayer, Ed Schleeter, Mike Rogers.

1 Q Is it your understanding that as you stated in para-  
2 graph 12 of your affidavit, Exhibit 23, that none of these people  
3 really had any expertise in the proper operation of a pinball  
4 machine?

5 A I would clarify that understanding. There was an  
6 occasion where an individual named Joel Miller who worked at  
7 Atari came to visit, and he was purported to be a pinball  
8 expert.

9 He came to give whatever advice he may have to assist  
10 us in the development of the El Toro electronic pinball.

11 He was an experienced pinball game player, and that  
12 was the limit of his expertise. So by inference having been  
13 told by Steve Mayer and Larry Emmons and others he was the  
14 expert within the corporate structure I was led to the  
15 assumption that there was no one in the company that had  
16 specific experience in the design, manufacture of pinball games.

17 Steve Mayer, Larry Emmons and others at Cyan  
18 Engineering had explicitly told me that they did not have that  
19 experience.

20 Q In connection with this observation of the game  
21 during play, that is what you might consider an eyeball observa-  
22 tion, watching it and getting just a general view of it?

23 A Yes.

24 Q I believe during your direct testimony you indicated  
25 your work on the El Toro project stopped sometime you believe



1 in June of 1974, is that correct?

2 A That approximate time frame, yes.

3 Q You left Cyan in August of 1974, is that correct?

4 A Yes.

5 Q To your knowledge was any work done during that time  
6 interval on the El Toro project?

7 A Not that I recall.

8 Q To your knowledge was any work done on any pinball  
9 project at Cyan during that period?

10 A No.

11 Q Do you believe that you were in a position at Cyan  
12 to most likely know if any work were done on the pinball project?

13 MR. GOLDENBERG: Objection.

14 A Yes, I believe I was in that position up until the  
15 last two weeks of my employment. After I gave notice they may  
16 have withheld information from me.

17 Q At the present time do you still believe that all of  
18 the statements that you made in your affidavit and your declara-  
19 tion are true and correct to the best of your recollection?

20 A Yes.

21 MR. KATZ: I have no further questions.

22 RE CROSS EXAMINATION

23 BY MR. GOLDENBERG:

24 Q I just have a few. Would you take Exhibit 7, sir,  
25 the original.

1 I believe it was your testimony in response to a  
2 question from Mr. Katz that this note in your handwriting --  
3 acting as a friend of Gottlieb & Co. -- that is a note you made  
4 as a result of a telephone conversation with Steve Mayer?

5 A Yes.

6 Q Tell me, sir, that all the other notes above the line  
7 in Exhibit 7, do they refer to notes of conversations with Mr.  
8 Mayer or Mr. Schnayer?

9 A Mr. Schnayer.

10 Q Isn't it possible, sir, that this note -- acting as a  
11 friend of Gottlieb & Co. -- that is something Mr. Schnayer said  
12 to you characterizing Cyan Engineering and Atari?

13 A No, I specifically recall the words being stated to  
14 me by Steve Mayer.

15 Q When did you have that conversation with Mr. Mayer?

16 A The same day I spoke with Mr. Schnayer for the first  
17 time.

18 Q You made that note there in the same area.

19 Below the line there are some names and telephone  
20 numbers. Could you tell me what those are?

21 A Steve Mayer's name and then the telephone number for  
22 Cyan Engineering which I called and found out that Steve was  
23 not at Cyan Engineering but was at Atari in the San Francisco  
24 Bay area. They gave me his phone number there which is also  
25 present on the sheet of paper.

Q For some reason you chose to make your notes of the Mayer conversation in the area where you made your notes of conversation with Mr. Schnayer, is that correct?

A Yes. There was a reason for that.

Q What was that?

A Those notes from Mr. Schnayer indicated that there was a pinball patent which was granted and held by Bally. There were some notes relating to the legal proceedings. I made the note that Atari's relationship with Gottlieb relating to those proceedings in that same area on that piece of paper.

Q Mr. Schnayer didn't tell you that Atari was acting as a friend of D. Gottlieb?

A No. I asked him what Atari's role was in the proceedings, and he told me they were not a participant.

Q That is all he told you?

A That's all he told me.

Q With respect to the modified El Toro game, whether or not the matrix was wired under the playfield, there was in fact a matrix, was there not?

A Yes.

Q The switches were connected in the matrix, were they not?

A Yes.

Q The lamps were?

A Yes.

1 Q And the digital display was connected to that same  
2 matrix?

3 A Yes.

4 Q When Mr. Mayer told you that he wanted to have the  
5 hardware connected in that phase, I take it you discussed the  
6 matter with him, is that correct?

7 A Yes.

8 Q And you questioned that?

9 A Yes.

10 Q He didn't accept your thoughts but held to his  
11 original thinking, is that correct?

12 A Yes.

13 Q That was because he believed that to be a more  
14 economical way to do it?

15 A Yes.

16 MR. KATZ: Objection to the question on the grounds  
17 that the witness isn't competent to testify as to what Mayer  
18 was thinking.

19 BY MR. GOLDENBERG:

20 Q That is something he told you, wasn't it, sir?

21 A To the best of my recollection, yes.

22 Q The desire to do it economically was one of the  
23 criteria or objectives of the program, wasn't it?

24 A Yes. There were other factors, one being the  
25 increased use of memory to write the program by using the

implementation selected by Steve Mayer. There was some discussion of which was the cheaper implementations: some additional interface electronics or the additional memory required to do it his way. He was the final authority and decided on his implementation which is reflected in the schematic.

Q That is a situation that arises frequently in the design of computer controlled electronic equipment as to whether to perform a particular function using hardware or do it in software, isn't it?

A Yes.

MR. KATZ: Objection to the question as lacking foundation.

BY MR. GOLDENBERG:

Q Based on your experience, sir?

A Yes, it is.

Q Decisions are reached using engineering compromises, is that a fair statement, sir?

MR. KATZ: Objection to the question as leading and mischaracterizing prior testimony.

BY MR. GOLDENBERG:

Q The decisions are reached based on what the project leader wants to do, isn't it?

A Dictatorial authority, yes. We had a disagreement. I felt it was less expensive to do it in a more straightforward

1 manner and Steve Mayer disagreed. He was the designer, so he  
2 did it his way.

3 Q That is not uncommon?

4 A No, that is standard operating procedure.

5 Q This game box that you spoke of -- I believe it is  
6 your testimony that you worked on that and then that the INTELLEC  
7 4 system could be connected either to the game box or the  
8 El Toro game, is that correct, sir?

9 A Yes.

10 Q The cabling changes had to be made and also the  
11 different programs had to be utilized depending on which game  
12 was going to be controlled?

13 A Yes.

14 Q Was the same interface board used, sir?

15 A No.

16 Q It was a different interface board?

17 A Yes.

18 Q In response to the questions about sketches and  
19 drawings, you didn't recall the first time you saw sketches  
20 and drawings.

21 Did you see any kind of sketch or drawing or schematic  
22 prior to the open house?

23 A Oh, yes. I recall seeing preliminary and early  
24 versions of schematics and sketches. I just don't recall the  
25 specific event of the first time I saw it.

1 Q But it was prior to the open house by, what -- several  
2 weeks?

3 A Oh, more than that. It would have been very soon  
4 after I began work on the project. Probably within the first  
5 few days or first week.

6 Q Do you know the sketches that you recall seeing, sir,  
7 do you recall who made them?

8 A Steve Mayer.

9 MR. KATZ: Objection to the question as lacking  
10 foundation.

11 BY MR. GOLDENBERG:

12 Q I believe it is your testimony in response to a  
13 question from Mr. Katz that Mr. Mayer did the design of the  
14 modified El Toro system, is that correct?

15 A Yes.

16 Q There may have been suggestions from Mr. Emmons or  
17 Mr. Milner and others at Cyan Engineering?

18 A Yes.

19 Q Do you recall, sir, whether he received any suggestions  
20 or help with that design from sources external to Cyan  
21 Engineering?

22 A As we have discussed at some length there were  
23 consultations with Intel personnel.

24 Q Would you recall any specific thing that Intel people  
25 told Mr. Mayer to do or suggested that he do?



1 A No, I don't know the specifics.

2 Q Do you know that they suggested anything specific to  
3 him, sir?

4 A Yes.

5 Q What was that?

6 A By matter of inference in that he would discuss a  
7 problem that he was having with me, indicate he was going to  
8 make a phone call to Intel to seek some additional information  
9 to help him resolve the problem. Sometime later he would come  
10 back after that phone call within the same day and indicate he  
11 had a new approach or a method for surmounting the difficulties  
12 he was having.

13 Q Give me an example of such a problem, such a phone  
14 call, such a come back by Mr. Mayer.

15 A I have told you I don't recall the specifics of those.

16 Q You don't recall any specifics?

17 A No.

18 Q Do you recall, sir, whether they suggested to him  
19 that he use the matrix in the system?

20 A Since I don't recall the specifics, I can't say  
21 whether they recommended the matrix or not.

22 Q The matter of the decision to use a matrix in the  
23 system, was that made just about the time you arrived or had  
24 it been made prior to your arrival on the scene, if you know?

25 MR. KATZ: Objection to the question as lacking

1 foundation.

2 A I don't know.

3 BY MR. GOLDENBERG:

4 Q When was the first time that you heard that a matrix  
5 was going to be used in the system?

6 A The first time the implementation of the hardware  
7 was used.

8 Q That was shortly after your arrival there?

9 A Yes, but I don't know whether that decision had been  
10 made by Steve Mayer prior to my arrival or not.

11 Q Mr. Joel Miller, you talked about him, sir. How long  
12 was he at Cyan Engineering on the occasion of this visit?

13 A One day. He came late one day, stayed overnight and  
14 left the next day.

15 Q Did he visit part of the second day as well, or do  
16 you know?

17 A I think he was in the Cyan facilities only one day.

18 Q Was he there an hour, two hours, three hours? What  
19 is your best recollection?

20 A Half a day.

21 Q Three to four hours at most?

22 A Yes.

23 Q What was the status of the El Toro project on the  
24 occasion of his visit?

25 A I think the software and the hardware were in an

1 advanced development stage. The coding and testing of the  
2 software had begun and the fabrication of the interface board  
3 had been initiated.

4 Q Was the game itself in a playable condition?

5 A I don't believe it was at the time he visited, but  
6 I'm not certain. It may have been just becoming playable.

7 Q Sir, what is your recollection about what he did or  
8 looked at insofar as the El Toro project was concerned on the  
9 occasion of that visit?

10 A As I recall he reviewed the hardware design and  
11 schematics with Steve Mayer and the software architecture and  
12 software implementation with me, looked at the playfield and  
13 the game and so forth.

14 Q Do you recall, sir, whether he made any comments or  
15 suggestions at that time?

16 A I don't believe he had any suggestions relating to  
17 improvement of what Steve and I were doing.

18 Q Do you recall, sir, whether he said anything to the  
19 effect: look, you guys have got it all wrong. You better go  
20 back and start over again?

21 A No, I don't recall anything like that.

22 Q Did the course of the project change as a result of  
23 his visit?

24 A No, I don't recall his visit having any influence on  
25 it whatsoever.

1 Q At any time that you had any kind of an association  
2 with the El Toro project did anyone say: look, this is not  
3 working, we have got to start over again, anything like that?

4 A Not exactly. I do recall an event where a -- let's  
5 call it a production pricing exercise was conducted where Steve  
6 Mayer worked with some of the production people at Atari to  
7 determine what production costs may be for the design of the  
8 El Toro game that we had developed.

9 As a result of that exercise it was found that there  
10 was no cost advantage to the microprocessor implementation over  
11 the standard electromechanical implementation.

12 At that time work on the project was halted.

13 Q Was that after the open house?

14 A Yes.

15 Q Do you know where this production pricing exercise  
16 was carried out? Was it carried out in Grass Valley or was  
17 it down in Sunnyvale?

18 A Both places. Atari was in Los Gatos at that time.

19 Q I'm sorry. Did these production people come to Grass  
20 Valley for this purpose?

21 A I don't believe so. I believe that Steve Mayer took  
22 the schematics and some notes as to the hardware required for  
23 a microprocessor controlled circuit including the microprocessor  
24 memories, diode chips and things of that sort.

25 They did some packaging and costing based on that.

1 Q How do you know work on the project was stopped?

2 A Steve Mayer indicated the results of their pricing  
3 session were such that there was no cost advantage and there-  
4 fore no competitive advantage to put the game into production,  
5 that improvements to it would just cost additional money and  
6 therefore the program would be terminated at that point.

7 Q He said that to you?

8 A More or less. Not in those specific words. I don't  
9 recall the specific words, but he indicated there was no cost  
10 advantage or no competitive advantage to continuing at that  
11 point.

12 There might have been an advantage in the future when  
13 the price of such integrated circuits as were used in this  
14 design came down.

15 Q That was the problem, wasn't it, sir, that at that  
16 time the microprocessor and its associated chips were relatively  
17 new in the marketplace and their prices were relatively high,  
18 weren't they?

19 MR. KATZ: Objection to the question as calling for  
20 speculation. There is no showing that this witness has the  
21 foundation to answer a question like that.

22 Also I object to the question as being indefinite as  
23 what do you mean by the problem.

24 BY MR. GOLDENBERG:

25 Q If you know, sir, the cost problem that we have been

1 talking about.

2 Q One of the factors controlling the cost of such  
3 machine was the cost of the integrated circuits which were new  
4 and which were not overly expensive but history had shown that  
5 prices of such devices decrease dramatically with time.

6 Q That has been your experience really as long as you  
7 have been in the electronics business?

8 A Yes.

9 Q New devices come on the market, initially their cost  
10 is high and as industry gears up to produce them their cost  
11 drops really dramatically?

12 A Yes.

13 Q Things which at one time were not economically feasible  
14 subsequently become economically feasible?

15 A Yes.

16 Q I think you did testify in that respect that before  
17 you left some additional pinball machines were received by  
18 Cyan Engineering, isn't that correct?

19 A Yes, I recall at least one additional machine being  
20 brought into the facility. I believe it was in a non-operating  
21 state. I can't recall playing it or seeing anybody play it.

22 Q Do you recall the name of that game?

23 A No, I don't.

24 Q Was it Delta Queen?

25 A I'm not certain.

1 Q Isn't that a name suggested to you by Mr. Schnayer in  
2 a conversation with him?

3 A That's true, yes.

4 Q Do you have any reason to disagree with that?

5 A I have no reason to disagree or agree because I don't  
6 have a specific recollection of what it was.

7 Q Do you know the manufacturer of the game Delta Queen?

8 A No, I don't.

9 Q What was the purpose of bringing in this additional  
10 pinball machine, operating or non-operating, as you understood  
11 it at that time, sir?

12 MR. KATZ: Objection to the question as lacking  
13 foundation that he knows what the purpose was and whose purpose.

14 A I was not told why it was brought in.

15 BY MR. GOLDENBERG:

16 Q So some interest in pinball continued, didn't it,  
17 about the time you were leaving Atari, did it not?

18 MR. KATZ: Objection to the question as lacking  
19 foundation that this witness would know whether there was an  
20 interest or not an interest.

21 BY MR. GOLDENBERG:

22 Q Can you answer the question?

23 A There was interest, but I cannot be specific as to  
24 what that interest was. The people at Cyan Engineering enjoyed  
25 playing games including pinball machines, and we had several



1 machines placed at local establishments, bars and so forth  
2 around the town and split the proceeds from those games with  
3 the establishment owners.

4 It could have been for in-house use of play. It  
5 could have been for additional development work. It could have  
6 been for placement at a local business establishment.

7 I don't know what the interest was in that machine.

8 Q Was that a relatively common practice at Cyan  
9 Engineering, to put games out at local establishments?

10 A During the time I was there we always had one or  
11 more out, yes.

12 Q Was that ever done with El Toro?

13 A No, not to the best of my knowledge. Not while I  
14 was with Cyan Engineering.

15 Q Tell me, sir, when they did that with a game at a  
16 local establishment, how did they keep it secret?

17 MR. KATZ: Objection to the question as presupposing  
18 that those games were secret.

19 A The only game that I recall was one of the early  
20 versions of Road Race, a road racing game. It was placed in  
21 a bar in town just about the time the production was started  
22 on that game so there would have been no need for secrecy since  
23 it was in production.

24 It was not the policy to place games that were in  
25 development out in the field.

Q Once games were done with development they went out for this local establishment kind of thing?

A Yes.

Q That was not uncommon policy at Cyan Engineering, to your knowledge?

A Correct.

MR. GOLDENBERG: I have no further questions.

MR. KATZ: I would like to have a recess so I can discuss a question with counsel before I consider it.

(Recess taken.)

AFTER RECESS

BY MR. KATZ:

Q I only have one question. With the El Toro construction, you referred to the switches and the lights and the digital display just now on redirect by Mr. Goldenberg as being a single matrix.

I don't know if you meant to say that or whether you meant to say that they were in a single matrix or separate matrices or what.

A They are in separate matrices but the matrices are interdependent in that some of the same controlled signals are used in all three matrices. What I was referring to was that dependency between those three arrays or matrices of functions which has an additional design restriction imposed upon the

software.

MR. KATZ: I have no further questions.

MR. GOLDENBERG: I would like the record to show that at this recess Mr. Katz and Mr. Cox' attorney had a conversation. Then Mr. Cox had a separate conversation with his attorney.

During your conversation with your attorney, sir, was this matter of matrices discussed?

A No, it was not. I am glad you clarified that so there would be no false implication on the record.

MR. GOLDENBERG: I am sure you are, sir, I am sure you are.

I have no questions.

(Whereupon the deposition was concluded.)

I hereby certify that I have read the foregoing testimony and subscribe to the same.

\_\_\_\_\_  
Gregory Cox

I hereby certify that this signature was placed in my presence on this \_\_\_\_\_ day of \_\_\_\_\_, 1981. I am a duly authorized Notary Public in and for the County of \_\_\_\_\_, Commonwealth of Pennsylvania. My commission expires \_\_\_\_\_.

## I N D E X

Witness

GREGORY COX

CrossGoldenberg - 279  
Katz - 326RecrossGoldenberg - 350  
Katz - 365

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Civil 78 C 2246

Gregory Cox October 12, 1981  
Name of Deponent Date of Deposition

I, the undersigned, hereby certify that I have read the foregoing described deposition and that to the best of my knowledge it is true and accurate (with the exception of the following changes:)

PAGE	LINE	CHANGE	REASON FOR CHANGE
280	23	HE WANTED ME TO TO	MISPOKEN
		HE WANTED TO	
285	6	AND TO IN	TRANSCRIPTION ERROR
315	15	LABORATORY TO OFFICE	MISPOKEN OR TRANSCRIPTION ERROR
360	24	diode to I/O	TRANSCRIPTION ERROR

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